USER MANUAL

MODEL 3088
RocketLink-G NTU
G.SHDSL Modem

PATTON Electronics Co.

An ISO-9001
Certified Company

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1.0 COMPLIANCE INFORMATION

1.1 RADIO AND TV INTERFERENCE

The equipment generates and uses radio frequency energy, and if not installed and used properly-that is, in strict accordance with the manufacturer's instructions-may cause interference to radio and television reception. The equipment has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart B of Part 15 of FCC rules, which are designed to provide reasonable protection from such interference in a commercial installation. However, there is no guarantee that interference will not occur in a particular installation. If the equipment causes interference to radio or television reception, which can be determined by disconnecting the cables, try to correct the interference by one or more of the following measures: moving the computing equipment away from the receiver, re-orienting the receiving antenna, and/or plugging the receiving equipment into a different AC outlet (such that the computing equipment and receiver are on different branches).

1.2 FCC PART 68 (ACTA) STATEMENT

This equipment complies with Part 68 of FCC rules and the requirements adopted by ACTA. ON the bottom side of this equipment is a label that contains-among other information-a product identifier in the format US: AAAEQ##TXXXX. If requested, this number must be provided to the telephone company.

The method used to connect this equipment to the premises wiring and telephone network must comply with the applicable FCC Part 68 rules and requirements adopted by the ACTA.

If this equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But if advance notice isn't practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

The telephone company may make changes in its facilities, equipment, operations or procedures that could affect the operation of the equipment. If this happens the telephone company will provide advance notice in order for you to make necessary modifications to maintain uninterrupted service.

If trouble is experienced with this equipment, for repair or warranty information, please contact our company. If the equipment is causing harm to

the telephone network, the telephone company may request that you disconnect the equipment until the problem is resolved.

Connection to party line service is subject to state tariffs. Contact the state public utility commission, public service commission or corporation commission for information.

1.3 INDUSTRY CANADA NOTICE

This equipment meets the applicable Industry Canada Terminal Equipment Technical Specifications. This is confirmed by the registration number. The abbreviation, IC, before the registration number signifies that registration was performed based on a Declaration of Conformity indicating that Industry Canada technical specifications were met. It does not imply that Industry Canada approved the equipment.

This Declaration of Conformity means that the equipment meets certain telecommunications network protective, operational and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction. Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above condition may not prevent degradation of service in some situations. Repairs to some certified equipment should be made by an authorized maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment. Users should ensure for their own protection that the ground connections of the power utility, telephone lines and internal metallic water pipe system, are connected together. This protection may be particularly important in rural areas.

1.4 CE NOTICE

This equipment conforms to the requirements of Council Directive 1999/5/EC on the approximation of the laws of the member states relating to Radio and Telecommunication Terminal Equipment and the mutual recognition of their conformity.

2.0 WARRANTY INFORMATION

Patton Electronics warrants all Model 3088 components to be free from defects, and will—at our option—repair or replace the product should it fail within one year from the first date of shipment.

This warranty is limited to defects in workmanship or materials, and does not cover customer damage, abuse or unauthorized modification. If this product fails or does not perform as warranted, your sole recourse shall be repair or replacement as described above. Under no condition shall Patton Electronics be liable for any damages incurred by the use of this product. These damages include, but are not limited to, the following: lost profits, lost savings and incidental or consequential damages arising from the use of or inability to use this product. Patton Electronics specifically disclaims all other warranties, expressed or implied, and the installation or use of this product shall be deemed an acceptance of these terms by the user

Note Conformity documents of all Patton products can be viewed online at www.patton.com under the appropriate product page.

2.1 SERVICE

All warranty and non-warranty repairs must be returned freight prepaid and insured to Patton Electronics. All returns must have a Return Materials Authorization number on the outside of the shipping container. This number may be obtained from Patton Electronics Technical Services at:

- Tel: **+1 (301) 975-1007**
- Email: **support@patton.com**
- URL: **http://www.patton.com**

Note Packages received without an RMA number will not be accepted.

Note The Model 3088 is flash upgradeable. Please refer to Patton website, or contact Technical Support for the latest version of the software.

3.0 GENERAL INFORMATION

Thank you for your purchase of this Patton Electronics product. This product has been thoroughly inspected and tested and is warranted for One Year parts and labor. If any questions or problems arise during installation or use of this product, please do not hesitate to contact Patton Electronics Technical Support at **+1 (301) 975-1007**.

3.1 FEATURES

- Symmetrical high data rate DSL (G.SHDSL)
- Data rates up to 4.6Mbps in 64-kbps intervals
- Serial V.35 (DCE only) or X.21 (selectable DCE or DTE) interface
- RS232 console port for management and configuration
- Built-in testing and diagnostics
- RocketLink Plug 'n' Play for easy installations
- Interoperable with other Patton G.SHDSL modems
- Universal power options
- Front panel status indicators
- CE marked

3.2 DESCRIPTION

The Patton Electronics Model 3088 G.SHDSL RocketLink provides high speed 2-wire connectivity to ISPs, PTTs, and corporations using Symmetrical High data rate Digital Subscriber Line (G.SHDSL) Technology.

The Model 3088/CA provides a V.35 interface on a DB-25 female connector. Model 3088/D provides and X.21 interface on a DB-15 female connector. Features include Loopback diagnostics, SNMP/HTTP remote management capabilities using RocketLink Plug 'n' Play and inband externally accessible configuration switches.

As a symmetric DSL NTU, RocketLink DSL offers the same data rates in both directions over a single pair of regular twisted pair lines using TC-PAM modulation. Line connection is made with an RJ-45 jack. Standard versions of Model 3088 are powered by an 100/230 VAC (Universal) supply.

4.0 CONFIGURATION

The Model 3088 (see figure 1) has two configuration modes, DIP switch and software.

Figure 1. Model 3088 (3088/D version shown)

DIP switch configuration mode is entered by starting the unit with the DIP switches in any position other than all OFF or all ON. In DIP switch configuration mode, the DIP switch settings are read at system startup and used to configure the unit. Once the unit has started in DIP switch mode it will remain in DIP switch mode, and its settings cannot be changed. Console commands used to configure the unit will report that the unit is in DIP switch configuration and will not change the configuration. Likewise, EOC variables cannot be used to configure the device. Also note that changing the DIP switch settings while the unit is running will have no effect on the configuration as the DIP switches are only read on startup.

Software configuration mode is entered by starting the unit with the DIP switches set to all ON. The system then reads any configuration that might have been saved to FLASH. If no configuration has been saved, then the factory defaults are loaded. The unit may be further configured by console commands or by EOC.

The Model 3088 provides the following parameters for configuring the unit.

Parameter	Description	Possible Values	Default Value
Password	The password used to login to the console.	Character strings 1–9 characters long.	patton
Circuit ID	The circuit ID used to identify the unit.	Character string 1–64 characters long.	Patton Model 3088
Front Panel Switches	If the unit is populated with front panel switches, they can be used to start and stop test modes. If they are disabled, however, the front panel switch settings will be ignored.	Enabled or Disabled	Enabled
DTE Loops	The V.35 interface can request LALs and RDLs using its RRDL and RLAL pins. If DTE loops are disabled, requests for loopbacks on these pins will be ignored.	Enabled or Disabled	Enabled
TX Clock	The serial TX data can be sampled on either the falling edge (normal) or rising edge (inverted) of the TX clock.	Normal or Inverted	Normal
Timeslots	The number of DSL timeslots. This controls both the DSL and the serial data rate. The data rate is calculated by the equation: data rate = #timeslots x 64k	1–72	4

Parameter	Description	Possible Values	Default Value
Clock Mode	Controls DSL and serial clock sources. Internal clock mode means the 3088 provides its own clock to both the serial interface and the DSL link. External clock mode means the serial interface provides the clock used for the DSL link. Receive recover clock mode means the DSL link provides the clock to the serial interface.	Internal, External, or Receive Recover	Receive Recover
Annex	The G.991.2 Annex.	A or B	B
Line Probe	A proprietary method to set the DSL data rate to the best rate that both units can support. Used for rate adaptive applications. This can only be used for data rates of 3–36 timeslots.	Enabled or Disabled	Disabled
Loopback	The 3088 provides both a local loopback (LAL) and a remote loopback (RDL). This can be used to troubleshoot problems.	OFF, LAL, or RDL	OFF
Pattern	The 3088 provides an internal PRBS pattern generator and detector that can be used to run BER tests without external equipment. The patterns offered are 511 and 511 with errors.	OFF, 511, or 511E	OFF
DSL Error Monitor Maximum Intervals	The number of errors allowed in an interval before considering the interval errored. A value of 0 disables the error monitor.	0–255	3
DSL Error Monitor Interval Time	The length, in seconds, of an interval.	1–255	1

Parameter	Description	Possible Values	Default Value
DSL Error Monitor Interval Count	The number of errored intervals allowed before restarting the DSL link.	1–255	3
DSL Error Monitor Total Intervals	The number of intervals to inspect before disabling the error monitor.	0–255	10
DSL Error Monitor Startup Delay	The length, in seconds, to wait after DSL link comes up before enabling the error monitor.	0–255	5

4.1 CONFIGURING THE DIP SWITCHES

The Model 3088 is equipped with two sets of DIP switches, which allow configuration of the unit for a wide variety of applications. This section describes switch locations and explains all possible configurations.

The two sets of DIP switches are externally accessible from the underside of the Model 3088 (see figure 2).

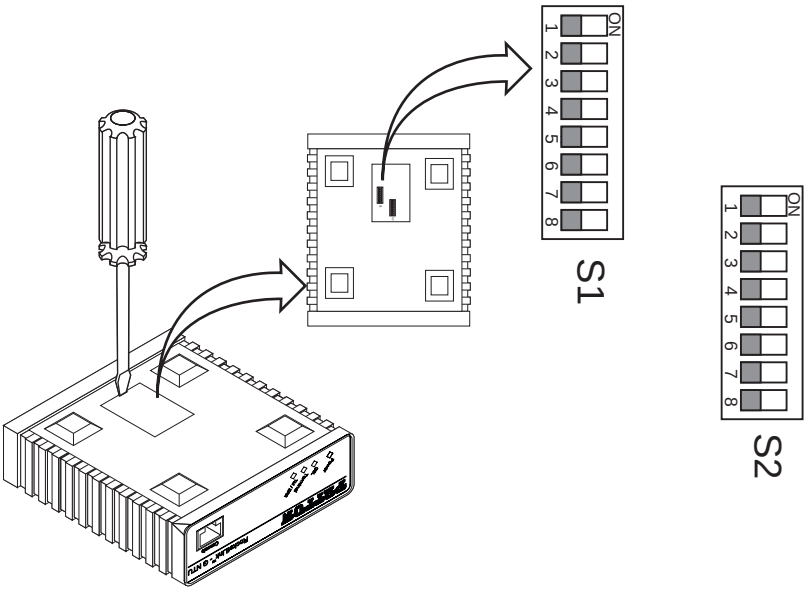


Figure 2. Underside of Model 3088 showing location of DIP switches

The two sets of DIP switches on the underside of the Model 3088 are referred to as *S1* and *S2*. As shown in figure 3, the orientation of all DIP switches is the same with respect to “ON” and “OFF” positions

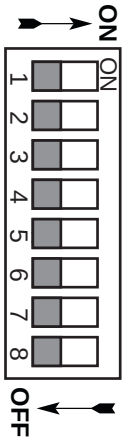


Figure 3. Close-up of configuration switches (all sets are identical appearance)

4.2 SYSTEM RESET MODE

System reset mode is entered by switching all DIP switches to the OFF position and power cycling the unit. A VT100 emulator configured for 19,200 kbps/1 stop bit/ no parity/ XON-XOFF flow control can be used to access the console. Upon restart, you will see the message “Reset Mode”.

System reset mode provides two functions:

- Software upgrades
- Configuration reset to factory defaults

Software Upgrades

The software is upgraded by waiting for the “Reset Mode” message. Then, the user can send an Intel HEX file supplied by Patton. After the VT100 emulator has finished sending this file, the 3088 will respond with a message stating how many errors were detected. The user may then set the DIP switches to the desired configuration and power cycle the unit to run the upgraded software.

Configuration Reset to Factory Defaults

To recover from a forgotten password, the user may reset the unit to its factory configuration. After seeing the “Reset Mode” message, the user should type the ‘*’ key. This will result in a ‘:’ prompt. At the prompt, the user should enter the command reset. This will restore the unit to the factory configuration. The unit can then be restarted with the settings in place.

4.3 DIP SWITCH SETTINGS

The 3088 can be configured with DIP switches. If the DIP switches are set to anything other than all ON, then the unit will be in DIP switch configuration. In DIP switch configuration, the console and EOC cannot be used to change configuration.

The following table describes the DIP switch functions.

Position	Function	Factory Default	
S1-8	TX Clock	ON	Normal
S1-7	Data Rate	ON	256K
S1-6		ON	
S1-5		ON	
S1-4		ON	
S1-3		ON	
S1-2		OFF	
S1-1		OFF	
S2-8	Reserved	OFF	
S2-7		OFF	
S2-6	DTE Loops	OFF	Disabled
S2-5	Clock Mode	OFF	Receive-Recover
S2-4		ON	
S2-3	Annex	OFF	Annex B
S2-2	Line Probe	ON	Disabled
S2-1	Front Panel Switches	OFF	Enabled

S1-8: TX Clock

S1-8	Setting	Description
ON	Normal	TD sampled on falling edge of TX clock.
OFF	Inverted	TD sampled on rising edge of TX clock.

S1-7 – S1-1: Data Rate

This setting controls the DSL data rate and the serial data rate.

S1-7	S1-6	S1-5	S1-4	S1-3	S1-2	S1-1	Data Rate (kbps)
ON	ON	ON	ON	ON	ON	OFF	64
ON	ON	ON	ON	ON	OFF	ON	128
ON	ON	ON	ON	ON	OFF	OFF	192
ON	ON	ON	ON	OFF	ON	ON	256
ON	ON	ON	ON	OFF	ON	OFF	320
ON	ON	ON	ON	OFF	OFF	ON	384
ON	ON	ON	ON	OFF	OFF	OFF	448
ON	ON	ON	OFF	ON	ON	ON	512
ON	ON	ON	OFF	ON	ON	OFF	576
ON	ON	ON	OFF	ON	OFF	ON	640
ON	ON	ON	OFF	ON	OFF	OFF	704
ON	ON	ON	OFF	OFF	ON	ON	768
ON	ON	ON	OFF	OFF	ON	OFF	832
ON	ON	ON	OFF	OFF	OFF	ON	896
ON	ON	ON	OFF	OFF	OFF	OFF	960
ON	ON	OFF	ON	ON	ON	ON	1024
ON	ON	OFF	ON	ON	ON	OFF	1088
ON	ON	OFF	ON	ON	OFF	ON	1152
ON	ON	OFF	ON	ON	OFF	OFF	1216
ON	ON	OFF	ON	OFF	ON	ON	1280
ON	ON	OFF	ON	OFF	ON	OFF	1344
ON	ON	OFF	ON	OFF	OFF	ON	1408
ON	ON	OFF	ON	OFF	OFF	OFF	1472
ON	ON	OFF	OFF	ON	ON	ON	1536
ON	ON	OFF	OFF	ON	ON	OFF	1600
ON	ON	OFF	OFF	ON	OFF	ON	1664
ON	ON	OFF	OFF	ON	OFF	OFF	1728
ON	ON	OFF	OFF	OFF	ON	ON	1792
ON	ON	OFF	OFF	OFF	ON	OFF	1856

S1-7	S1-6	S1-5	S1-4	S1-3	S1-2	S1-1	Data Rate (kbps)
ON	ON	OFF	OFF	OFF	OFF	ON	1920
ON	ON	OFF	OFF	OFF	OFF	OFF	1984
ON	OFF	ON	ON	ON	ON	ON	2048
ON	OFF	ON	ON	ON	ON	OFF	2112
ON	OFF	ON	ON	ON	OFF	ON	2176
ON	OFF	ON	ON	ON	OFF	OFF	2240
ON	OFF	ON	ON	OFF	ON	ON	2304
ON	OFF	ON	ON	OFF	ON	OFF	2368
ON	OFF	ON	ON	OFF	OFF	ON	2432
ON	OFF	ON	ON	OFF	OFF	OFF	2496
ON	OFF	ON	OFF	ON	ON	ON	2560
ON	OFF	ON	OFF	ON	ON	OFF	2624
ON	OFF	ON	OFF	ON	OFF	ON	2688
ON	OFF	ON	OFF	ON	OFF	OFF	2752
ON	OFF	ON	OFF	OFF	ON	ON	2816
ON	OFF	ON	OFF	OFF	ON	OFF	2880
ON	OFF	ON	OFF	OFF	OFF	ON	2944
ON	OFF	ON	OFF	OFF	OFF	OFF	3008
ON	OFF	OFF	ON	ON	ON	ON	3072
ON	OFF	OFF	ON	ON	ON	OFF	3136
ON	OFF	OFF	ON	ON	OFF	ON	3200
ON	OFF	OFF	ON	ON	OFF	OFF	3264
ON	OFF	OFF	ON	OFF	ON	ON	3328
ON	OFF	OFF	ON	OFF	ON	OFF	3392
ON	OFF	OFF	ON	OFF	OFF	ON	3456
ON	OFF	OFF	ON	OFF	OFF	OFF	3520
ON	OFF	OFF	OFF	ON	ON	ON	3584
ON	OFF	OFF	OFF	ON	ON	OFF	3648
ON	OFF	OFF	OFF	ON	OFF	ON	3712
ON	OFF	OFF	OFF	ON	OFF	OFF	3776
ON	OFF	OFF	OFF	OFF	ON	ON	3840
ON	OFF	OFF	OFF	OFF	ON	OFF	3904
ON	OFF	OFF	OFF	OFF	OFF	ON	3968
ON	OFF	OFF	OFF	OFF	OFF	OFF	4032
OFF	ON	ON	ON	ON	ON	ON	4096
OFF	ON	ON	ON	ON	ON	OFF	4160
OFF	ON	ON	ON	ON	OFF	ON	4224
OFF	ON	ON	ON	ON	OFF	OFF	4288

S1-7	S1-6	S1-5	S1-4	S1-3	S1-2	S1-1	Data Rate (kbps)
OFF	ON	ON	ON	OFF	ON	ON	4352
OFF	ON	ON	ON	OFF	ON	OFF	4416
OFF	ON	ON	ON	OFF	OFF	ON	4480
OFF	ON	ON	ON	OFF	OFF	OFF	4544
OFF	ON	ON	OFF	ON	ON	ON	4608

Loops

The V.35 interface has pins two pins, one to request an LAL and the other to request and RDL. If DTE loops are enabled, then when these pins are asserted, the 3088/C will start a local loopback or a remote loopback. If DTE loops are disabled, these requests will be ignored.

S2-6	Setting
ON	Enabled
OFF	Disabled

S2-5 – S2-4: Clock Mode

The 3088 has three clock modes: internal, external, and receive-recover.

S2-5	S2-4	Clock Mode	Description
ON	ON	Internal	3088 provides both the serial and the DSL clock
ON	OFF	External	3088 uses the TX clock from the serial interface for the DSL clock.
OFF	OFF	Receive-Recover	3088 uses the RX clock from the DSL interface for the serial clock.
OFF	OFF		Reserved

S2-3: Annex A/B

Annex A is typically used in North American-like networks, whereas Annex B is typically used in European-like networks. The different annexes specify different PSD (power spectral density) masks because of the difference in T1 and E1 PSDs.

S2-3	Annex
ON	A
OFF	B

S2-2: Line Probe

Line probe is a mechanism that determines the highest rate (192K to 2304K) that the DSL link can reliably support. This takes place during training. The DSL rate will be set to the rate that line probe determines. Note that both the CO and CPE unit must have line probe enabled for it to take effect.

Line probe could be used to determine the best rate the line will support, and then the user could set the units for that rate and disable line probe so that the rate won't change without the user's knowledge.

S2-2	Line Probe
ON	Disabled
OFF	Enabled

S2-1: Front Panel Switches

The 3088 is optionally equipped with front panel switches for controlling test modes. If front panel switches are disabled, then their settings will be ignored.

S2-1	Front Panel Switches
ON	Disabled
OFF	Enabled

3.4 Console

The 3088 offers a console command line interface. A VT100 emulator configured to 19,200 kbps/1 stop bit/ no parity/ XON-XOFF flow control can be used to access the console.

Through the console, the following variables can be configured:

- **Password**: The password used to login to the console.

- **Circuit ID**: The circuit ID communicated to other units via EOC. EOC (Embedded Operations Channel) is an out-of-band channel specified in the G.991.2 standard for SHDSL. We use standard EOC messages for our remote loopback. The 3088 also supports proprietary EOC messages that allow a 3096RC to configure it.

- **Clock Mode:** The following options are available:

  – Internal: The 3088 provides the clock to both the serial and DSL interfaces.

  – External: The serial interface provides the clock used for the DSL interface (V.35 only).

  – Receive Recover: The clock recovered from the DSL is provided to the serial interface.

- **Data Rate**: Both the serial and DSL data rates are set by specifying the number of 64k timeslots.

- **Annex**: Either G.991.2 Annex A or Annex B.

- **DSL Error Monitor Max Interval Errors**: The number of errors allowed in an interval before considering the interval errored. A value of '0' disables the DSL error monitor.

- **DSL Error Monitor Interval Time**: The length in seconds of an interval.

- **DSL Error Monitor Interval Count**: The number of errored intervals allowed before restarting the DSL link.

- **DSL Error Monitor Total Intervals**: The number of intervals to inspect before disabling the error monitor.

- **DSL Error Monitor Startup Delay**: The length in seconds to wait after the DSL link is established before starting the error monitor.

- **Test Modes**: Loopbacks (LAL or RDL) and PRBS (pseudo random binary sequence) BER tests (511 or 511 with errors)

- **Line Probe**: Enable or disable Line Probe for rate adaptive applications.

The following status information is available through the command line interface:

- **LEDs**: Which software controlled LEDs are currently on.

- **FPSW Settings**: What the front panel switches are set to (if the unit is populated with them).
- **Configuration Mode**: Whether the 3088 is configured by DIP switches or software.
- **DSL Link State**: In Progress, Success, Deactivated, or Idle.
- **DSL Sync State**: Out of Sync, Acquiring Sync, In Sync, or Losing Sync.

  Note **DSL Link State vs. DSL Sync State**—The DSL link state describes whether the DSL is training (in progress), linked (success), deactivated (we don't have an option to deactivate the modem, so the user should not see this), or idle.

  The DSL sync state describes whether no sync words have been found (out of sync), there are no sync word errors (in sync), or whether we are transitioning from out of sync to in sync (acquiring sync) or vice versa (losing sync). Typically, when the link is training, the sync state goes from out of sync to acquiring sync to in sync.

- **DSL Actual Rate**: The actual rate at which the DSL link is running (minus DSL overhead).
- **DSL Line Condition**: Good or Poor.
- **Noise Margin Ratio**: the maximum tolerable increase in external noise power that still allows for BER of less than $1x\ 10^{-7}$.
- **DSL Error Counters**: The following error counters are available:
  - CRC
  - LOSW (Loss of Sync Word)
  - TX FIFO Full
  - TX FIFO Empty
  - TX FIFO Slip
  - TX Stuff
  - RX FIFO Full
  - RX FIFO Empty
  - RX FIFO Slip

Help Commands

The following commands are provided to help the user find the correct command:

- **help:** Lists all the commands that the console recognizes.
- **system help:** Lists all the commands that start with system that the console recognizes.
- **system set help:** Lists all the commands that start with system set that the console recognizes.
- **system show help:** Lists all the commands that start with system show that the console recognizes.
- **dsl help:** Lists all the commands that start with dsl that the console recognizes.
- **dsl set help:** Lists all the commands that start with dsl set that the console recognizes.
- **dsl show help:** Lists all the commands that start with dsl show that the console recognizes.
- **dsl show errcntr help:** Lists all the commands that start with dsl show errcntr that the console recognizes.

System Configuration Commands

The following commands allow the user to configure the system:

- **system set password <password>:** Sets the system password.
- **system set circuitid <circuitid>:** Sets the circuit ID.
- **system set timeslots <1–72>:** Sets the number of DSL timeslots. The data rate is calculated by 64K x timeslots.

- **system set clockmode <internal|external|receiverecover>:** Sets the clock mode. Internal clock mode means the 3088 provides the clock to both the DSL and the serial interface. External clock mode means the 3088 uses the serial transmit clock as its DSL transmit clock (V.35 only). Receive recover clock mode means that the 3088 uses the DSL receive clock as its DSL transmit clock and as the serial receive clock.

  Note **X.21 External Clock Mode**—The X.21 interface expects the DCE to provide the clock used for both transmitting data and for sampling receive data. When the 3088/D is set as a DCE, it may be used in internal or receive recover clock modes. The DSL generates a clock that is provided to the X.21 interface.

  When the 3088/D is a DTE, it may be used in external clock mode. The X.21 interface needs to provide the clock. This clock is used by the DSL to sample the serial data and also to update the receive data.

  The 3088 is set for either DCE or DTE by flipping the daughter-card. The 3088 is a DCE if DCE points away from the serial interface toward the front of the 3088. Note that this is different than the 3086/D.

The following commands allow the user to view the current system configuration:

- **system show circuitid**: Shows the circuit ID.
- **system show timeslots:** Shows the number of timeslots. The data rate can be calculated by 64K x timeslots.
- **system show clockmode:** Shows the clock mode.

Any changes to the system configuration or the DSL configuration will be lost on the next power cycle unless the changes are saved. The command **system save config** is used to save the changes.

System Status Commands

The following commands show system status:

- **system show status**: Shows the following system status information: LEDs, DSL test mode, front panel switch settings, DSL link state, and configuration mode.
- **system show configmode**: Shows the configuration mode. If the DIP switches are set to all on, then the configuration mode is DIP switch. Otherwise, the configuration mode is software. In DIP switch configuration mode, the system configuration cannot be changed through either the console or EOC.

- **system show leds:** Shows the current state of all software controlled LEDs.
- **system show fpsw**: Shows the current front panel switch settings.

DSL Configuration Commands

The following commands are used to configure the DSL:

- **dsl set annex <a|b>:** Set the annex.
- **dsl set lineprobe <enabled|disabled>:** Enable or disable line probe.
- **dsl set loopback <off|lal|rdl>:** Start or stop loopbacks.
- **dsl set pattern <off|511|511e>**: Start or stop PRBS generator and BER meter.

DSL Error Monitor

Startup Delay	**Interval 1**	**Interval 2**	**…**	**Interval totint**
⇦flstartdelay⇨	⇦flinttime⇨	⇦flinttime⇨	⇦flinttime⇨	⇦flinttime⇨

The DSL error monitor inspects intervals to see if they have met the error threshold (maxint). If the error monitor finds a certain number (intcnt) of intervals that meet or exceed the error threshold, it will restart the DSL link. The error monitor will wait (startdelay) seconds after the DSL link comes up before it begins monitoring errors. After the startup delay, it will check the number of errors that have occurred during each (inttime) seconds to see if they meet the error threshold. The error monitor inspects (totint) intervals before it stops.

Note Setting **maxint** to *0* disables the error monitor and setting **totint** to *0* causes the error monitor to run continuously.

The following commands configure the error monitor:

- **dsl set errmon maxint <maxint>:** Sets the number of errors allowed in an interval causes it to be considered an errored interval. If this is set to ‘0’, then the error monitor is disabled.
- **dsl set errmon inttime <inttime>:** Sets the length of each interval.
- **dsl set errmon intcnt <intcnt>**: Sets the number of errored intervals that causes the DSL link to restart.
- **dsl set errmon totint <totint>**: Sets the number of intervals to inspect for errors before disabling the error monitor. If this is set to ‘0’, then the error monitor will run continuously.

- **dsl set errmon startdelay <startdelay>:** Sets the number of seconds to wait after the DSL link comes up before the error monitor starts inspecting intervals.

The following commands display the current DSL configuration:

- **dsl show annex:** Shows the currently selected G.SH Annex.
- **dsl show lineprobe:** Shows whether or not Line Probe is currently enabled.
- **dsl show loopback:** Shows which loopback is currently running.
- **dsl show pattern**: Shows what PRBS pattern is currently running.

The following commands display the current DSL error monitor configuration:

- **dsl show errmon maxint:** Shows the maximum errors allowed in an interval before it is considered errored.
- **dsl show errmon inttime:** Shows the length in seconds of each interval.
- **dsl show errmon intcnt:** Shows the number of errored intervals allowed before restarting.
- **dsl show errmon totint:** Shows the number of intervals to monitor before disabling the error monitor.
- **dsl show errmon startdelay:** Shows the length in seconds to wait after the DSL link comes up before starting the error monitor.

Changing the data rate (**system set timeslots**), the clock mode (**system set clockmode**), the Annex (**dsl set annex**), or Line Probe (**dsl set lineprobe**), or the DSL error monitor settings will not take effect on the DSL link until the link restarts. The **dsl start** command restarts the DSL link.

DSL Status Commands

The following commands display DSL status:

- **dsl show status:** Shows the following DSL status information: link state, sync state, link speed, error counters, line condition, and noise margin.
- **dsl show linkstate**: Shows the state of the DSL link: idle, success, deactivated, or in progress.

- **dsl show syncstate**: Shows the sync state of the DSL link: out of sync, acquiring sync, in sync, or losing sync
- **dsl show linkspeed**: Shows the actual DSL data rate (minus DSL overhead)
- **dsl show linecond**: Shows the line condition: good or poor
- **dsl show nmr**: Shows the noise margin ratio.
- **dsl show errcntrs**: Shows the following error counters: CRC, LOSW, TX FIFO Full, TX FIFO Empty, TX FIFO Slip, TX Stuff, RX FIFO Full, RX FIFO Empty, and RX FIFO Slip.
- **dsl show errcntr crc:** Shows the number of CRC errors that have occurred since either startup or the last time that error counters were cleared.
- **dsl show errcntr losw**: Shows the number of LOSW errors that have occurred since either startup or the last time that error counters were cleared.
- **dsl show errcntr txfifofull**: Shows the number of TX FIFO Full errors that have occurred since either startup or the last time that error counters were cleared.
- **dsl show errcntr txfifoempty**: Shows the number of TX FIFO Empty errors that have occurred since either startup or the last time that error counters were cleared.
- **dsl show errcntr txfifoslip**: Shows the number of TX FIFO Slip errors that have occurred since either startup or the last time that error counters were cleared.
- **dsl show errcntr txstuff**: Shows the number of TX Stuff errors that have occurred since either startup or the last time that error counters were cleared.
- **dsl show errcntr rxfifofull**: Shows the number of RX FIFO Full errors that have occurred since either startup or the last time that error counters were cleared.
- **dsl show errcntr rxfifoempty**: Shows the number of RX FIFO Empty errors that have occurred since either startup or the last time that error counters were cleared.
- **dsl show errcntr rxfifoslip**: Shows the number of RX FIFO Slip errors that have occurred since either startup or the last time that error counters were cleared.

The **dsl clear errcntrs** command clears the error counters.

Remote Console

Provided that there is a DSL link to a second 3088, a user may login to the first 3088's console and enter the remote console command to access the second 3088's console. Using this remote console feature, the user can configure and query the status of the second 3088 from a remote location. When the user is finished with the remote console, the logout command can be used to return to the local console.

Example Command Line Interface Session

```
password: ******
> system set circuitid “3088 Circuit ID”
> system set timeslots 3
> system set clockmode internal
> dsl set annex b
> dsl set lineprobe disabled
> system save config
> dsl start
> system show status
leds: power: on dsl: on tm/er: off
dsl test mode:
  ber status: idle
  errors:     0
  time:       0
front panel switches: sw1: normal sw2: normal
dsl link state: success
configuration mode: software
> dsl show status
link state: success
sync state: in sync
link speed: 192k
error counters:
  crc:           0
  losw:          0
  tx fifo full:  0
  tx fifo empty: 0
  tx fifo slip:  0
  tx stuff:      0
  rx fifo full:  0
  rx fifo empty: 0
  rx fifo slip:  0
line condition: good
noise margin: 3.5
> remote console
```

```
password: ******
> dsl clear errcntrs
> dsl show errcntrs
crc:           0
losw:          0
tx fifo full:  0
tx fifo empty: 0
tx fifo slip:  0
tx stuff:      0
rx fifo full:  0
rx fifo empty: 0
rx fifo slip:  0
> logout
exiting remote console

> dsl set loopback rdl
> dsl set pattern 511e
> dsl show testmode
ber status: in progress
errors:     42
time:       12
> dsl set pattern off
> dsl set loopback off
> logout
password:
```

4.4 ROCKETLINK PLUG 'N' PLAY

The RocketLink Plug 'n' Play feature allows ISPs, carriers and PTTs to quickly upgrade the link speed for a customer without requiring a visit to re-configure the Customer Premise (CP) Model 3088. This feature also allows service providers to set up all of the configurations at the Central Office (via the ForeFront AIS system) before installing the stand alone units, saving time spent configuring or re-configuring DIP switches.

> **Note** RocketLink Plug 'n' Play is only available when using a ForeFront Model 3096RC as the CO unit.

The RocketLink Plug 'n' Play feature allows the user to configure the DTE rate (bandwidth allocation, see Switches S1-1 through S1-7) of the CP unit via the ForeFront Model 3096RC at the Central Office (CO). The stand alone unit at the Customer Premise (CP) site will automatically configure itself to the DTE rate (Bandwidth Allocation) defined at the Model 3096RC. Other configuration parameters remain in the default setting.

Follow the instructions below to activate RocketLink Plug ‘n’ Play between CO (Model 3096RC and CP (Model 3088) units:

- Set the Model 3096RC (CO) to either Internal or External clocking mode as defined by the application.
- Set the Model 3088 (CP) to “RocketLink Plug-and-Play CP” by setting S1 and S2 DIP switches in the ON position as described in figure 4.

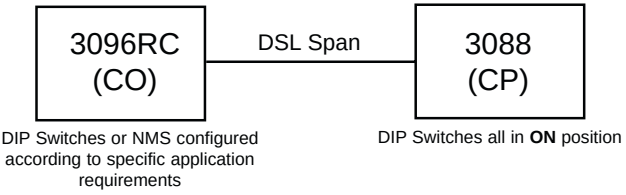


Figure 4. Typical RocketLink Plug ‘n’ Play Application

When the CO and CP units connect over DSL, the CP will enter a pre-defined default configuration (Receive Recovered Clocking). During the negotiation process between the units, the CO unit will configure the DTE rate/line rate on the CP unit as defined by the settings of the CO unit. When additional bandwidth is required, only the configuration of the CO unit should be changed. This feature gives ISPs, LECs and PTTs the ability to provision bandwidth on an as needed basis to customers.

5.0 INSTALLATION

Once the Model 3088 is properly configured, it is ready to connect to the twisted pair interface, to the serial port, and to the power source. This section tells you how to make these connections.

5.1 CONNECTING THE TWISTED PAIR INTERFACE

The Model 3088 supports communication between two DTE devices as follows:

Using 24 AWG (.5 mm) wire:

- up to 32,000 feet (9.7 km) at 192 kbps
- up to 18,500 feet (5.6 km) at 2.312 Mbps on

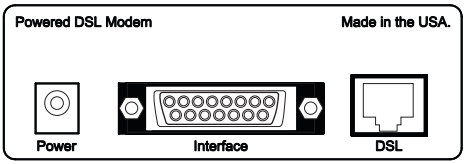
Using 26 AWG (.4 mm) wire:

- up to 23,000 feet (7 km) at 192 kbps
- up to 13,200 feet (4 km) at 2.312 Mbps on

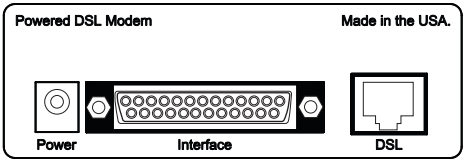
Two things are essential:

1. These units work in pairs. Both units at the end of the twisted pair DSL span must be set for the same DTE rate—one unit set as CO, the other as CP.
2. To function properly, the Model 3088 needs one twisted pair of metallic wire. This twisted pair must be unconditioned, dry, metallic wire, between 19 (.9mm) and 26 AWG (.4mm) (the higher number gauges will limit distance). Standard dial-up telephone circuits, or leased circuits that run through signal equalization equipment, or standard, flat modular telephone type cable, are not acceptable.

The RJ-45 connector on the Model 3088's twisted pair interface is polarity insensitive and is wired for a two-wire interface. The signal/pin relationships are shown in figure 5.



3088/D (V.35, female DB-15)



3088/CA (V.35, female DB-25)

Figure 5. Model 3088 V.35/X.21 interfaces.

5.2 CONNECTING THE MODEL 3088/CA (V.35) SERIAL INTERFACE

Model 3088/CA supports V.35 serial port connections. This section describes how to connect the serial ports to your V.35 equipment.

Connecting the Model 3088/CA (V.35) to a "DTE" Device

The Model 3088/CA provides a V.35 DCE (data circuit terminating equipment) interface on an DB-25 female connector. As a DCE, this interface is designed to connect to DTE equipment, such as a router. When connecting the V.35 interface of the Model 3088/CA to your DTE device, use a V.35 straight-through cable (See figure 6). Appendix C describes pin assignments and signal sources for the Model 3088/CA V.35 interface. When purchasing or constructing an interface cable, refer to the pin diagrams in Appendix C as a guide.

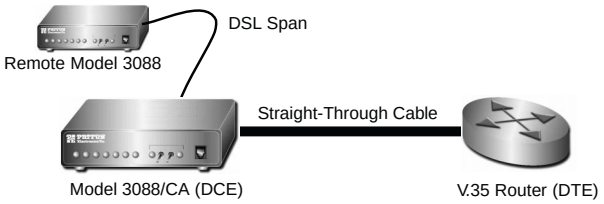


Figure 6. Connecting the Model 3088/CA to V.35 Serial DTE

Connecting the Model 3088/CA (V.35) to a "DCE" Device

The Model 3088/CA provides a V.35 DCE (data circuit terminating equipment) interface on an DB-25 female connector. As a DCE, this interface is designed to connect to DTE equipment, such as a router. However, tail-circuit applications require connection to another DCE equipment, such as a multiplexer. When connecting the V.35 interface of the Model 3088/CA to your DCE device (see figure 7), use a V.35 tail circuit cable. Some applications may also require the installation of a V.35 tail-circuit buffer to account for small differences in clock frequency between the 3088/CA and the V.35 DCE (Multiplexer).

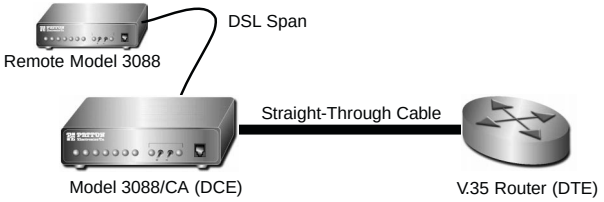


Figure 7. Connecting the Model 3088/CA to V.35 Serial DCE

5.3 CONNECTING THE MODEL 3088/D (X.21) SERIAL INTERFACE

Model 3088/D supports X.21 serial port connections. This section describes how to connect the serial ports to your X.21 equipment.

Connecting the Model 3088/D (X.21) to a "DCE" or "DTE" Device

The Model 3088/D provides an X.21 interface on a DB-15 female connector. The X.21 interface default configuration is DCE for connection to DTE (data terminal equipment) such as a router. However, the X.21 interface on the Model 3088/D may be configured as DTE (data terminal equip-

ment) for connection to DCE such as a modem or multiplexer. When connecting the X.21 interface of the Model 3088/D to your DTE or DCE device, use an X.21 straight-through cable (See figure 8).

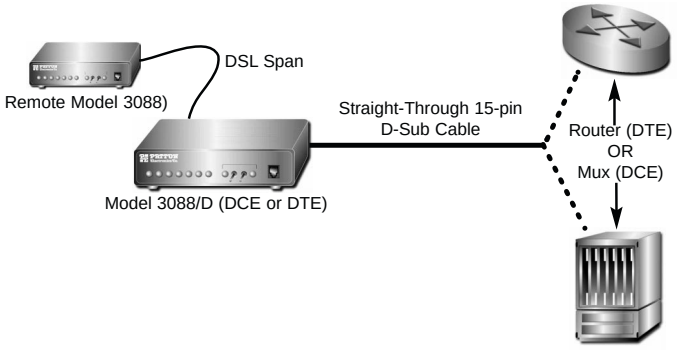


Figure 8. Connecting the Model 3088/D to X.21 DTE or DCE

To change the DCE/DTE orientation from the default position (DCE), you must open the case Model 3088/D case.

Opening the Case

To open the Model 3088/D case, insert a flat head screw driver into an open slot on both sides of the case, as in figure 9. Twist the screw driver head slightly and the top half of the case will separate from the lower half, as in figure 9. Be careful not to damage the PC-board mounted components.

Figure 9. Opening the 3088 case with a small screwdriver

The DCE/DTE strap is located on the top side of the 3088/D pc board (See figure 10, below). The arrows on the top of the strap indicate the configuration of the X.21 port (for example, if the DCE arrows are pointing toward the DB-15 connector, the X.21 port is wired as a DCE). Change the DCE/DTE orientation by pulling the strap out of its socket, rotating it 180º, then plugging the strap back into the socket. You will see that the DCE/DTE arrows now point in the opposite directions, showing the new configuration of the X.21 port. To close the case, fit the 2 halves together snugly and snap them back in place.

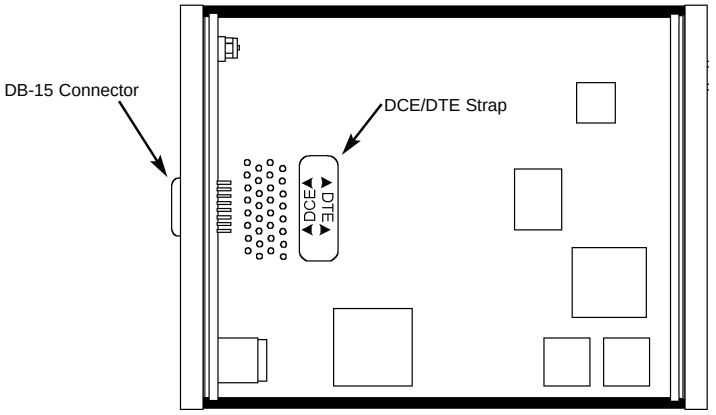


Figure 10. Setting the DCE/DTE Strap

5.4 CONNECTING POWER

The Model 3088 uses a 5 VDC, 2A universal input 100–240 VAC, power supply (center pin is +5V). The universal input power supply has a male IEC-320 power entry connector. This power supply connects to the Model 3088 by means of a barrel jack on the rear panel. Many international power cords are available for the universal power supply (Please refer to Appendix B for country-specific power cords.

The Model 3088 powers up as soon as it is plugged into an AC outlet--there is no power switch.

WARNING

There are no user-serviceable parts in the power supply section of the Model 3088. Fuse replacement should only be performed by qualified service personnel. Contact Patton Electronics Technical support at (301)975-1007, via our web site at www.patton.com, or by e-mail at support@patton.com, for more information.

6.0 OPERATION

Once the Model 3088 is properly configured and installed, it should operate transparently. This sections describes power-up, reading the LED status monitors, and using the built-in loopback test modes.

6.1 POWER-UP

To apply power to the Model 3088, first be sure that you have read section 5.4, “Connecting Power” on page 32, and that the unit is connected to the appropriate power source. Power up the unit.

6.2 LED STATUS MONITORS

There are four LEDs that provide feedback on the state of the unit. Figure 11 shows the location of the front panel LEDs. Following figure 10 is a description of each LED’s function.

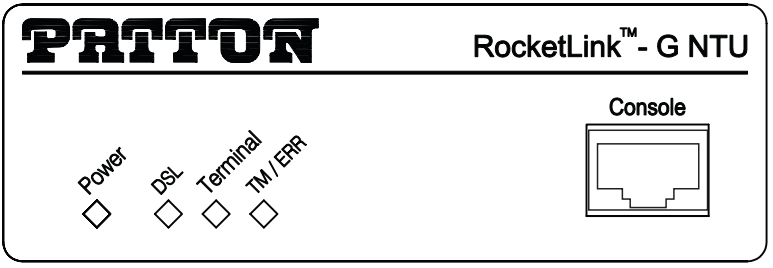


Figure 11. Model 3088/CA front panel

Power (Green)

The Power LED glows solid during normal operation. At startup, during the POST, the LED blinks once every second. If the POST fails, the unit does not enter normal operation, and the LED blinks once every 0.4 seconds.

DSL (Green)

The DSL LED glows solid while a DSL link is established. While the DSL link is training it blinks once every second.

Term (Green)

The Term LED glows solid under the following circumstances:

- **3088/CA with V.35 interface**: If the serial interface has asserted DTR
- **3088/D with the X.21 interface:**
  - **Configured as DCE**: Indicates that the “Control” signals have been asserted.
  - **Configured as DTE**: Indicates that the “Indication” signals have been asserted

TM/ER (Red)

The TM/ER LED is used to indicate that a test mode is in progress or an error has been detected. It blinks once every second while a test mode is starting. It glows solid while a test mode is in progress. It blinks once if an error is detected either during a test mode, or in normal DSL operation.

6.3 TEST MODES

The 3088 offers test modes in the form of loopbacks, PRBS pattern generators, and combinations of both. This section discusses how the test modes work. Figure 12 is a block digram of the Model 3088 with respect to test modes.

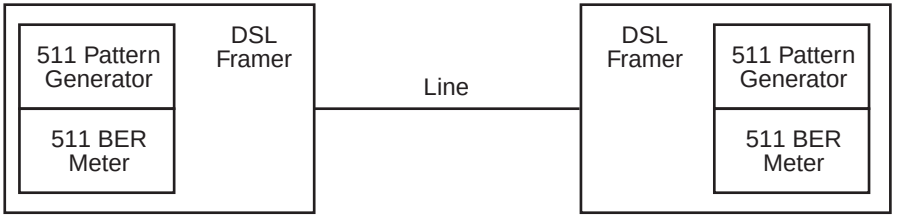


Figure 12. Model 3088 Block Diagram

Loopbacks

The 3088 supports both Local Analog Loopbacks (LAL) and Remote Digital Loopbacks (RDL). These can be initiated either from the optional front panel switches or by the console command dsl set loopback <off|lal|rdl>. The data path for the LAL is shown in figure 13.

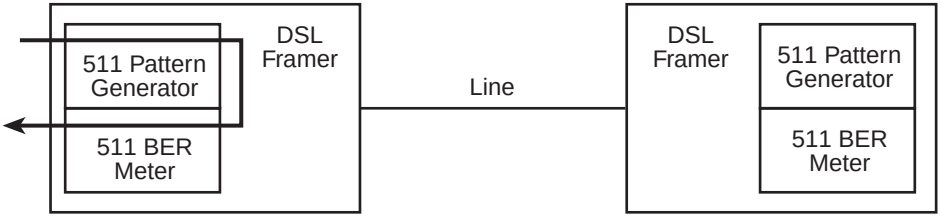


Figure 13. Local Analog Loopback diagram

The data received from the serial interface is looped back before going out on the DSL line. Note that this loopback occurs after the pattern generator/BER meter. This means that running a 511 pattern is conjunction with an LAL should result in no error detected by the meter.

The data path for the RDL is shown in figure 14.

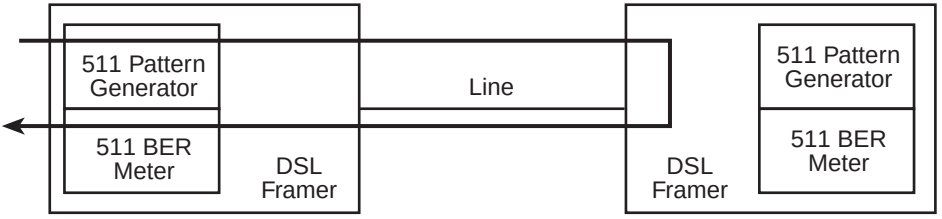


Figure 14. Remote Digital Loopback diagram

The RDL causes the remote unit to loop the data received from the DSL line back to the DSL line.

Patterns

The 3088 can generate and detect 511 and 511 with Error patterns. These can be initiated either by the optional front panel switches or by the console command dsl set pattern <off|511|511e>. When the pattern is started, the DSL framer uses its internal 511 pattern generator for its DSL TX data instead of the data received from the serial interface. Also, the framer's internal BER Meter tries to detect a 511 pattern in the DSL RX Data.

Because the BER Meter always runs when the pattern generator runs, the meter will detect errors if either the pattern is not either looped back or the remote unit is not transmitting a 511 pattern.

One point to note is that the way errors are generated in the 511E pattern generates CRC errors. This can cause the DSL error monitor to restart the link if the thresholds are set low enough.

7.0 REMOTE CONSOLE MANUAL INFORMATION

The PC user (near-end) may configure and verify status of the remote 3088 (far-end) via a Remote Console session. The PC user must log onto the 3088 (near-end) unit to establish a remote console session. Once done, the remote 3088 (far-end) appears as a unit which is locally connected through the RS-232 console port. All commands are transmitted over the G.SHDSL link in the EOC channel.

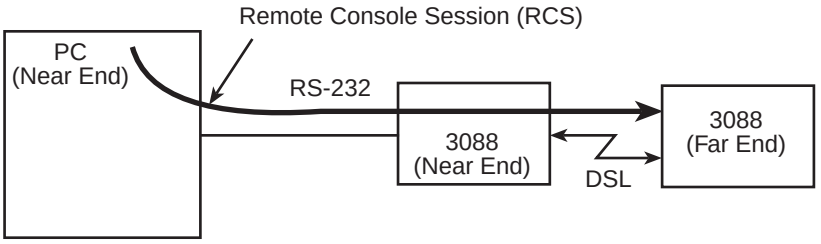


Figure 15. Remote control session diagram

7.1 ESTABLISHING A REMOTE CONSOLE SESSION

How to Connect

The following steps are to establish a connection to the remote 3088 (far-end) via Remote Console Session (RCS):

1. Configure a terminal emulation program (e.g., Hyperterminal) on PC (near-end) for 19.2 kbps, 8 data bits, no parity, 1 stop bit, no flow control. Connect it to the RS-232 console port of the 3088 (near-end).

2. At the password prompt, log in to the near-end Model 3088.

3. Ensure that a DSL link is established. You can verify an established DSL link by using the system show status command or by checking that the DSL LED is solid green. Upon executing the **show status** command, the **dsl link state** is shown as *success* if the DSL link is established.

4. At the command prompt, enter the command **remote console**.

5. Wait for the message *Console: Remote console connection established*.

   — If a DSL link is not established, or for some other reason the 3088 (far-end) does not respond in a reasonable amount of time, the following message appears: *Console: Remote console timed out trying to connect*. Enter the command remote console again.

— If 3088 (Far End) already has an active remote console session open, you will see the message *Console: Remote console connection request rejected*. This can also happen if the remote 3088 (far-end) has an established remote console session with the local 3088 (near-end) which has timed out.

6. Enter the password at the password prompt for the remote console session.

   Note The passwords for a local console session of the 3088 (near-end) and the remote console session of the 3088 (far-end) should be different for the purpose of security.

7. You should now be logged into the remote 3088(far-end) via the remote console session. The communication with the remote 3088 (far-end) is essentially the same as having a local console connection.

   Note The local or remote 3088 may be CO or CPE, as long as there is one of each. Either the CO or CPE unit may accept a remote console connection.

   Note With a remote console session open, a user at PC (far-end) is blocked from using the local console. Upon typing anything, the 3088 (far-end) sends a message to the PC (far-end) stating "Console: Remote console connection is open."

Figure 16 is a screenshot of opening a typical remote console session:

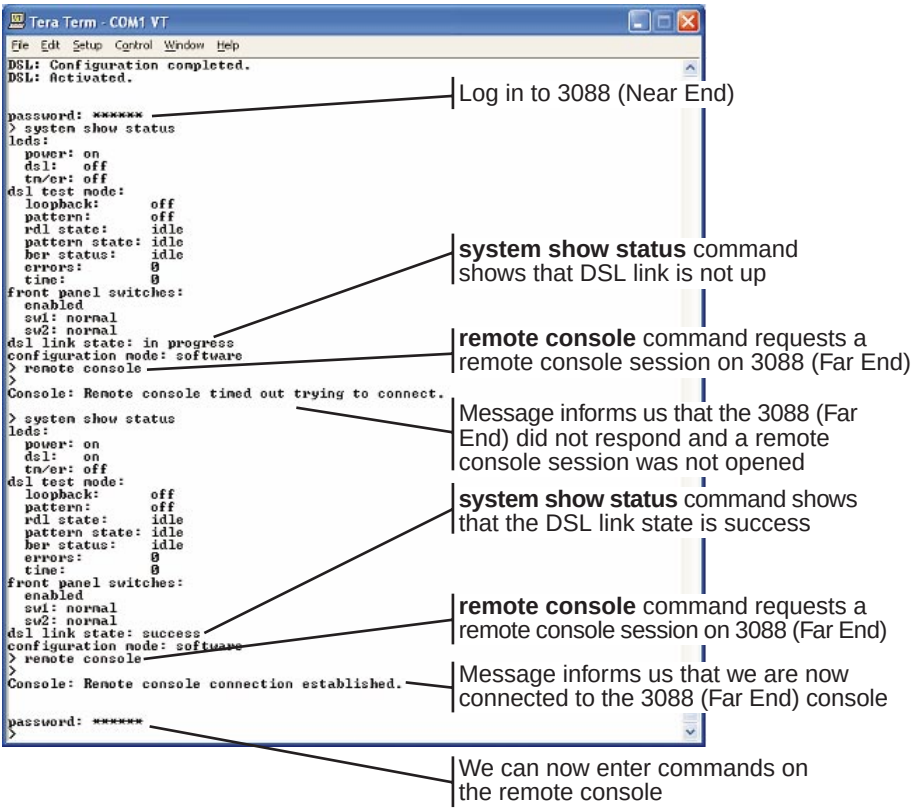


Figure 16. Opening a typical remote console session

How to Disconnect

The remote console session ends under any of the following conditions:

- The user enters the command **logout**
- A timeout period of 5 minutes elapses since the user has entered a command to the console.
- The DSL link drops.

The response upon logging out of the remote console session with the command **logout** is *Console: Remote console connection lost.* The fol-

lowing is what is displayed upon a user's logging out of a remote console session after logging in.

```
> remote console
>
Console: Remote console connection established.

password: ******
> logout
Console: Remote console connection lost.

>
```

The timeout period is a fixed, non-configurable parameter of 5 minutes. If the remote 3088 (far-end) has received no command within 5 minutes, it automatically terminates the RCS. Once the RCS is terminated, the PC (far-end) can establish a local console session if desired. However if the PC (near-end) wishes to re-establish a RCS, it is able to do so whether or not the PC (far-end) is in an active local session, because the RCS has priority over a local console session. If the PC (near-end) establishes an RCS while the PC (far-end) is on a local session, the PC (far-end) is kicked off.

Differences in Local and Remote Control Session Behavior

Since the remote console session communication occurs over the G.SHDSL link's EOC channel, some commands via the RCS have unusual effects.

- **system upgrade**: Do not issue this command via an RCS. A system upgrade must be done via the local console connection. If you should accidentally issue this command over an RCS, the remote 3088 (far-end) waits indefinitely for input (which is the system upgrade image) from the local console port of the 3088 (far-end). You must power-cycle the remote 3088 (far-end) to return it to the normal operational state. If this command is entered, 3088 (Far End) will have to be power-cycled.

- **dsl set loopback lal**: When this command is issued over the RCS, clearly the PC (near-end) can no longer communicate with the remote 3088 (far-end). See the diagram. Consequently the remote 3088 (far-end) can no longer receive any commands over the DSL channel from the PC (near-end). To recover from this situation, the DSL link will have to be dropped prior to establishing the RCS again. A short explanation is in order. Since the remote 3088 (far-end) no longer receives any commands from the PC (near-end), the RCS will time out in 5 minutes and attempts to send a disconnect message back to the local

3088 (near-end). However the local 3088 (near-end) is unable to receive this message and the local 3088 (near-end) does not know to terminate the RCS. For this reason, the DSL link must be dropped and re-established. At this point, the RCS can be established anew.

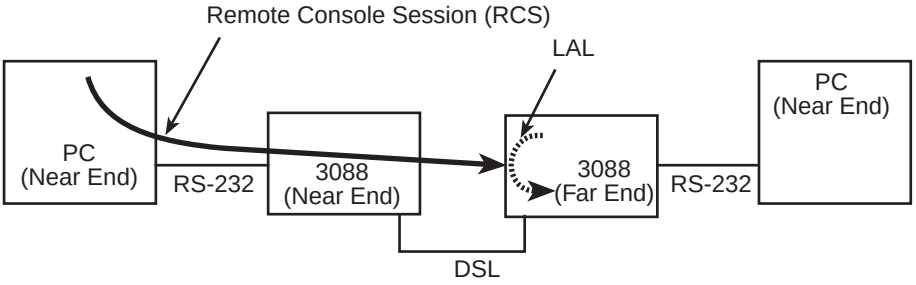


Figure 17. Remote control session with LAL diagram

- Restarting the dsl link will disconnect the remote console session. Whether a DSL link is up or not has no effect on the operation of the local console session.

8.0 MODEL 3088 SOFTWARE UPGRADE FEATURE

The 3088 is software upgradeable through the console port. Software images will be available in Intel Hex file format.

The software upgrade feature is available either by powering up the 3088 will all dipswitches set to the “Off” position, or by entering the “system upgrade” command on the command line interface. The software upgrade takes approximately 5 minutes to complete. The 3088 will print ‘.’ to the screen while the software upgrade is in process. When the software upgrade completes, it will print a message stating that it is complete and the number of errors, if any, that occurred.

Errors may occur during the software upgrade if the image is corrupt or if there is a disruption in the console port connection. The 3088 will print a message to the console port if it encounters any errors. In the event of an error, the portions of the old image may have been overwritten, and the unit may not be able to boot into operational mode. However, the unit may still boot into the software upgrade, so a new software image can still be loaded to bring the unit back to an operational state.

Here is the software upgrade procedure:

1. Obtain a software image Hex file.
2. Turn off the 3088.
3. Switch all DIP switches to the “Off” position.
4. Turn on the 3088.
5. Transfer the software image hex file through the console (8 bits/no parity/1 stop bit/XON-XOFF flow control).
6. When the transfer completes, turn the 3088 off.
7. Set the DIP switches for the proper configuration.
8. Turn on the 3088. It is now running the upgraded software.

9.0 RESET CONFIGURATION TO FACTORY DEFAULTS

The configuration can be reset to factory defaults from the software reset mode. This allows a user to recover from a forgotten password. To reset to the configuration, follow these steps:

1. Power down the unit.
2. Set all DIP switches to the OFF position.
3. Connect a PC to the Console port.
4. Open a VT100 terminal emulator (such as HyperTerminal). Configure the emulator for 19,200 kbps/1 stop bit/no parity/X-ON X-OFF flow control.
5. Power up the unit. The terminal should display the following message: “Reset Mode”.
6. Type the ‘*’ key. You will see a ‘: ‘ prompt.
7. Type the command ‘reset’.
8. When the command completes, the unit has been reset to factory configuration.
9. Set the DIP switches to the desired configuration. Power cycle the unit to begin using the new software.

APPENDIX A
SPECIFICATIONS

A.1 CLOCKING MODES

Internal, external (V.35 only), or receive recovered

A.2 DTE RATE

All 64k steps from 64 to 4608 kbps

A.3 SERIAL INTERFACE

V.35 (Model 3088/CA), DCE orientation;

X.21 (Model 3088/D), DCE or DTE orientation depending on orientation of daughter board mounted on the mother board.

A.4 SERIAL CONNECTOR

D-Sub-25 Female (Model 3088/CA)

D-Sub-15 Female (Model 3088/D)

A.5 DIAGNOSTICS

V.52 compliant (511/511E) pattern generator and detector with error injection mode controlled by front-panel switch. Local and Remote Loop-back control either by a front-panel switch or from the DTE interface.

A.6 STATUS LEDS

Power (Green)

The Power LED glows solid during normal operation. At startup, during the POST, the LED blinks once every second. If the POST fails, the unit does not enter normal operation, and the LED blinks once every 0.4 seconds.

DSL (Green)

The DSL LED glows solid while a DSL link is established. While the DSL link is training it blinks once every second.

Term (Green)

The Term LED glows solid under the following circumstances:

- **3088/CA with V.35 interface**: If the serial interface has asserted DTR
- **3088/D with the X.21 interface:**
  - **Configured as DCE**: Indicates that the “Control” signals have been asserted.
  - **Configured as DTE**: Indicates that the “Indication” signals have been asserted

TM/ER (Red)

The Test Mode/Error (TM/ER) LED is used to indicate that a test mode is in progress or an error has been detected. It blinks once every second while a test mode is starting. It glows solid while a test mode is in progress. It blinks once if an error is detected either during a test mode, or in normal DSL operation.

A.7 CONFIGURATION

Externally accessible DIP switches or SNMP managed through 3096RC

A.8 POWER

5 VDC from external desk top power supply, 90-260VAC, 50-60 Hz (Universal Input), 10W

A.9 COMPLIANCE

FCC Part 15, CE, ACTA (FCC Part 68): IC-CS03

A.10 TRANSMISSION LINE

Single Twisted Pair

A.11 LINE CODING

TC-PAM (Trellis Coded Pulse Amplitude Modulation)

A.12 LINE RATES (DSL LINE)

All nx64 rates from 64 kbps up to 4.6 Mbps

A.13 LINE INTERFACE

Transformer coupled, 2500 VRMS isolation

A.14 G.SHDSL PHYSICAL CONNECTION

RJ-45, 2-wire polarity insensitive pins 4 and 5

A.15 ENVIRONMENT

Operating temp: 32–122°F (0–50°C)

Humidity: 5–95% non-condensing

Altitude: 0–15,000 feet (0–4,600 meters)

APPENDIX B

FACTORY REPLACEMENT PARTS AND ACCESSORIES

Model #	Description
08055DCUI	100–240VAC (+5V ±5% reg. DC/2A) Universal Input Adapter
0805EUR	European Power Cord CEE 7 (“A”)
0805UK	United Kingdom Power Cord (“D”)
0805US	American Power Cord (“K”)
0805AUS	Australia/New Zealand Power Cord (“C”)
0805DEN	Denmark Power Cord (“E”)
0805FR	France/Belgium Power Cord (“F”)
0805IN	India Power Cord (“G”)
0805IS	Israel Power Cord (“H”)
0805JAP	Japan Power Cord (“J”)
0805SW	Switzerland Power Cord (“L”)
07M3088-UM	User Manual
2-34F25M	V.35 Gender Changer, M/34 female to DB-25 male
10-25M/35F-1	Cable, DB-25 Male to V.35 Female, 6 feet
10-25M/35M-1	Cable DB-25 Male to V.35 Male, 6 feet

APPENDIX C

MODEL 1088/CA INTERFACE PIN ASSIGNMENTS

V.35 INTERFACE
DB-25 FEMALE CONNECTOR
(DCE ORIENTATION)

Pin #	Signal
1	Frame Ground
2	TxD-a
3	RxD-a
4	RTS
5	CTS
6	DSR
7	Signal Ground
8	CD
9	RxC-b
11	ExtC-b
12	TxC-b
14	TxD-b
15	TxC-a
16	RxD-b
17	RxC-a
18	LL
20	DTR
21	RL
24	ExtC-a
25	TM

APPENDIX D

MODEL 3088/D INTERFACE PIN ASSIGNMENTS

X.21 INTERFACE
D-SUB-15 FEMALE CONNECTOR
DTW/DCE ORIENTATION

Pin	Signal
1	Frame Ground
2	T - Transmit Data-A (DTE Source)
3	C - Control-A (DTE Source)
4	R - Receive Data-A (DCE Source)
5	I - Indication-A (DCE Source)
6	S - Signal Element Timing-A (DCE Source)
7	BT - Byte Timing-A (DCE Source)
8	SGND - Signal Ground
9	T/ - Transmit Data-B (DTE Source)
10	C/ - Control-B (DTE Source)
11	R/ - Receive Data-B (DCE Source)
12	I/ Indication-B (DCE Source)
13	S/ Signal Element Timing-B (DCE Source)
14	BT/ - Byte Timing-B (DCE Source)

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